

## At What Price Inaccuracy?

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With the growing demand for GIS development programs at the federal, state, local, and private levels, I have noticed a tendency to search for low-cost and, therefore by their nature, lower accuracy, non-rigorous (i.e., non-photogrammetric) landbase solutions. It has been my experience that the landbase phase, which serves as the cornerstone for all other spatial data layers, comprises 60 percent of the initial total GIS expenditure. While I understand that in this climate of restrictive budgets GIS managers are continually striving to do more with less, I believe that it is false economy to cut accuracy corners in landbase photogrammetric development.

Frequently, the corner cutting approach is characterized by utilizing aerial or satellite imagery at resolutions that are inappropriate given the nominal map scale of the GIS landbase. Even more disquieting is the tendency to reduce or eliminate the ground or airborne GPS control network on which the photogrammetric landbase is developed. This tendency towards a non-rigorous photogrammetric restitution approach to landbase development is also becoming more apparent as the digital image map becomes more popular as the GIS landbase of choice. Very often, these image landbases are being constructed using control points abstracted from old existing low accuracy maps. The images are then warped one by one to approximately fit these questionable control points, with no rigorous image correction taking place internal to these control points. While this approach can produce a semi-accurate landbase when only a few images (ten or so) are involved, as the landbase grows to the more normal number of images (hundreds), the overall accuracy of the landbase declines because there is no overall fit along or between flight lines.

In addition, this non-rigorous approach to GIS landbase development does not take into account the third dimension — the photogrammetrically derived digital terrain model (DTM) — which, I believe, has become an indispensable part of any GIS. In fact, without an accurate DTM, I believe the usefulness of a GIS is diminished by half. While the non-rigorous approach certainly produces a usable GIS landbase, it has been my experience that the larger GIS community which requires spatially accurate data soon becomes frustrated with the inherent inaccuracy of the landbase itself, as well as with the effects of the disinformation disseminated by additional data layers created from the original data set. This dissatisfaction quickly results in a call for the development of new, more accurate data sets.

All too often the non-rigorous approach to GIS landbase development is taken because the user community is not fully aware of the limitations of inaccurate spatial data, nor the opportunities inherent in highly accurate spatial data. Unfortunately, I continue to see many user communities

equate the value of GIS spatial accuracy with very specific goals of a single program or application, and from this standpoint, they argue that the higher up-front cost of a more accurate GIS base cannot be justified. Figure 1 depicts the relationship between the unit cost of GIS development and spatial accuracy.

I believe that it will only be through the continued education efforts of academia, experienced government agencies, and the private sector that the long-term advantages of rigorously controlled photogrammetric landbase solutions will become apparent to the broader GIS user community. Furthermore, I believe that the inherent accuracy of this type of GIS landbase will attract a large number of users at all scales of GIS and will reduce the extensive landbase duplication that presently characterizes GIS efforts. In turn, the funds saved from less duplication can be channeled towards new developments in GIS technology and faster integration of GIS into the overall framework of society.

History has shown that the low cost, low quality approach to developing any form of infrastructure has proven to be short-term thinking and not in society's best interest. It is my hope that, as this profession matures, the utility of investing in the highest quality spatial data derived by rigorous photogrammetry will become apparent to all user communities.

